# SUBJECT INDEX


Amorphous materials, STM 292
Atomic structure of solid surfaces 235

Ballistic aggregation model 179
Ballistic growth and deposition 179
$BaNbO_3$, intergrowth of 106
$Ba_2Nb_5O_9$, structure of 106
Bismuth cuprates, structure of 118
γ-Brass, $Li_{21}X_5$ derivatives of 25
Brownian motion 211

Cage orbitals at border of Zintl-phases 26
Charge density waves (CDW) 258
Chemisorption
  on metals 285
  on semiconductor surfaces 269
Convergent beam electron diffraction (CBED) 105
Current image tunneling spectroscopy (CITS) 251

Diffusion fronts 196
Diffusion limited aggregation (DLA) 168, 206
Diffusion process
  fractal structures 211
  *see also* Multiphase diffusion

Electron energy loss spectrometry (EELS) 105
Electron microscopy 101
Energy-dispersive spectrometry (EDS) 105

Fractal dimensionality 136
Fractal geometry
  application to simulation results 166
  concepts of 136
Fractal measures 159
Fractal structures 135
  application to experiments 204
  ballistic growth and deposition 179
  Brownian motion 211
  Cantor set 136
  cluster growth models 167
  diffusion fronts 196
  diffusion-limited aggregation 168, 206
  diffusion process 211
  Eden model 167
  'fat' 157
  fractons 211
  gradient percolation 196
  growth models 166
  in chemistry and physics 214
  multifractals 159, 199, 213
  percolation 182, 204
  random walks 211
  rough surface growth models 185
  rough surfaces 209
  self-affine 149
  self-affine rough surface growth models 186
  self-similar 136, 140
  subfractals 158, 214
Fractal surfaces 199
Fractons 211

Gallium arsenide
  adsorbates on 278
  STM 265
  surface buckling 242
Germanium (100), STM 263
Germanium (111), STM 261
Gradient percolation 196
Graphite
  adsorbates on 258
  STM studies 256
  surface unit cell 257

High-resolution electron microscopy (HREM) 101
  background 101
  comparison with diffraction and analysis 105
  computerized image processing 125
  crystallographic image processing 125
  experimental conditions for 102
  image restoration 125
  intergrowth and disorder 105
  model confirmation and refinement methods 127
  on-line image recording and dynamic studies 123
  restrictions on solids that can be studied by 103
  specimen preparation 104
Highly oriented pyrolitic graphite (HOPG) 256

$K_3Nb_7O_{19}$, structure of 112

Layered compounds, STM studies 256
$Li_{21}X_5$ derivatives of γ-brass 25
Lithium
  Group 13 binary compounds 18, 37
  Group 13 ternary compounds 18, 37
  Group 14 binary compounds 14
  Group 14 compounds 23
    rocksalt structure derivatives 27
  Group 14 compounds with $X_2$ pairs 29
  Group 14 polynary transition metal compounds 17
  Group 14 ternary compounds 15
  Group E14 binary compounds 23
  Group E14 ternary compounds 34
  replacement in Zintl-phases 32
  specific physical and chemical properties 7
  ternary transition metal pnictides 21
  Zintl-phases containing 1
Lithium compounds, tungsten structure derivatives 35
Lithium phosphides 19
Lithium pnictides
  binary 11, 19
  ternary 11, 21
  transition metal and rare earth metal 13
Lithium tellurides 9
  binary and ternary 10
Low energy electron diffraction (LEED) 281

Metal oxide surfaces, STM 284
Metal surfaces
  atomic adsorbates 286
  atomic scale structure 282
  chemisorption 285
  molecular adsorption 292
  STM 280
Multifractals 159, 199, 213
Multiphase diffusion
  in binary systems 49
    comparison of reaction layer thickness in planar, cylindrical and spherical diffusion couples 74
    evaluation of diffusion coefficients in couples in which large volume changes occur 78
    evaluation of diffusion coefficients in vapour–solid couples compared with solid–solid couples 78
    general introduction 50
    influences of differences in cross-section of end members on layer morphology in planar couples 72
    interface concentrations in diffusion couples compared with bulk-equilibrium values 62
    Kirkendall and Matano planes in diffusion couples 63
    morphology of interphase interfaces if grain boundary diffusion is taking place 71
    phases formed in diffusion couples compared with phase diagram 60
    role of interphase interface in creation or annihilation of vacancies resulting from Kirkendall effect 68
    texture in reaction layers 77
    time dependence of penetration plot 55
  in quaternary systems 94
  in solid-state systems 47
  in ternary isothermal cross-section using diffusion couples 93
  in ternary systems 81
    influence of gas partial pressure on diffusion path 89
    influence of kinetic parameters on diffusion path 88
    influence of stoichiometry of end members on diffusion path 91
    periodic layer formation 91
    prediction of layer sequence 83
    rate-limiting step 87

NbO, intergrowth of 106

Oxide surfaces, STM 284

Percolation fractals 182, 204
Pnictides 19
  binary 19
  ternary transition metal 21
  *see also* Lithium pnictides

Random walks 211
Rocksalt structure derivatives 27
Rough surfaces
  fractal structures 209
  growth models 185
  growth of self-affine 186

Scanning tunneling microscopy (STM) 235
  amorphous materials 292
  background 235
  barrier height images 249
  charge density waves (CDW) 258
  chemisorption on metals 285
  chemisorption on semiconductor surfaces 269
  constant current images 248
  current or constant height images 249
  electronic structure 250
  Fourier methods 253
  GaAs(110) surface buckling 242
  gap variation 253
  graphite 256
  image interpretation 253
  imaging and contrast 248
  instrument design 254
  instrumentation 254
  jellium theories 241
  layered compounds 256
  metals and oxides 280
  noise sources 255
  reconstructed semiconductor surfaces 259
  registry 253
  *s*-wave theory 243
  *s*-wave tip 239
  spectroscopic imaging 250
  square well tunneling 237
  statistical analysis 254
  surface structure determination 242
  technique 247
  theory 236
  tip states 243
  tip surface interactions 244
  tunneling spectroscopy 250
  tunneling tip 256
  vibrational spectroscopy 252
Semiconductors
  chemisorption 269
  epitaxial growth 268
  step structure 266
  surface reconstructions 259
Silicon
  high index surfaces 264
  III–V adsorbates on 269
Silicon (100), STM 263
Silicon (111), 2×1, STM 263
Silicon (111), 7×7, STM 259
Silicon surfaces
  non-metal chemisorption 277
  transition metal chemisorption 273
Solid-on-solid (SOS) model for growth of rough surfaces 195
Solid surfaces, atomic structure of 235
Square well tunneling 237
Superconductors, high-$T_c$ 114

Tellurides, structural chemistry 9
Thallium cuprates, structure of 118
Transition metal–silicide interfaces 273
Transmission electron microscopy (TEM) 101
Tungsten structure derivatives 35

Vibrational spectroscopy 252

$YB_{a2}C_{u3}O_{7-x}$, structure of 114

Zintl anions 23
Zintl–Klemm concept 3
  extensions of 4
  mechanism of 6
Zintl-phases
  cage orbitals at border of 26
  constituents of 2
  containing lithium 1
    overview of 8
  lithium replacement in 32
  *see also* Lithium